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A Review Paper on Electricity Generation from Solar Energy

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Abstract*: *the Solar Energy is produced by the Sunlight is a non-vanishing renewable source of energy which is free from eco-friendly. Every hour enough sunlight energy reaches the earth to meet the world's energy demand for a whole year. In today's generation we needed Electricity every hour. This Solar Energy is generated by as per applications like industrial, commercial, and residential. It cans easily energy drawn from direct sunlight. So it is very efficiency & free environment pollution for surrounding. In this article, we have reviewed about the Solar Energy from Sunlight and discussed about their future trends and aspects. The article also tries to discussed working, solar panel types; emphasize the various applications and methods to promote the benefits of solar energy.

Keywords:* *Renewable energy, Solar panel, Photovoltaic cell, Modelling of PV Panel, Solar Concrete Collector

I. INTRODUCTION

Nowadays, due to the decreasing amount of renewable energy resources, the last ten years become more important for per watt cost of solar energy device. It is definitely set to become economical in the coming years and growing as better technology in terms of both cost and applications. Everyday earth receives sunlight above (1366W approx.) This is an unlimited source of energy which is available at no cost. The major benefit of solar energy over other conventional power generators is that the sunlight can be directly converted into solar energy with the use of smallest photovoltaic (PV) solar cells. There have been a large amount of research activities to combine the Sun's energy process by developing solar cells/panels/module with high converting form. the most advantages of solar energy is that it is free reachable to common people and available in large quantities of supply compared to that of the price of various fossil fuels and oils in the past ten years. Moreover, solar energy requires considerably lower manpower expenses over conventional energy production technology.

II. SOLAR ENERGY

Amount of energy in the form of heat and radiations called solar energy. Shown in Fig.1. It is radiant light and heat from sun that is natural source of energy using a range of ever changing and developing of technology such as solar thermal energy, solar architecture, solar heating, molten salt power plant and artificial photosynthesis. The large magnitude of solar power available makes highly appealing source of electricity. 30% (approx.) solar radiation is back to space while the rest is absorbed by ocean, clouds and land masses.

Solar Energy

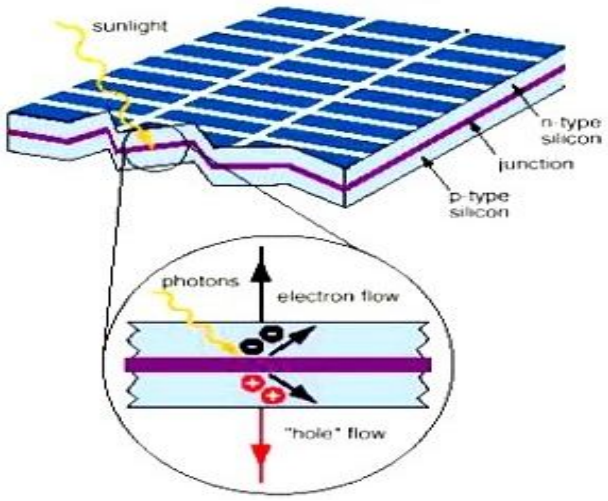

Figure 1 Internal of Reaction of Solar energy

III. WORKING OF SOLAR ENERGY

PV cells Convert Sunlight to Direct Current (DC) electricity. Charge Controller work as control the power from solar panel which reverse back to solar panel get cause of panel damage. Battery System act as storage of electric power is used when sunlight not available (i.e. night).From this system connected to inverter for convert Direct Current (DC) into Alternating Current (AC).

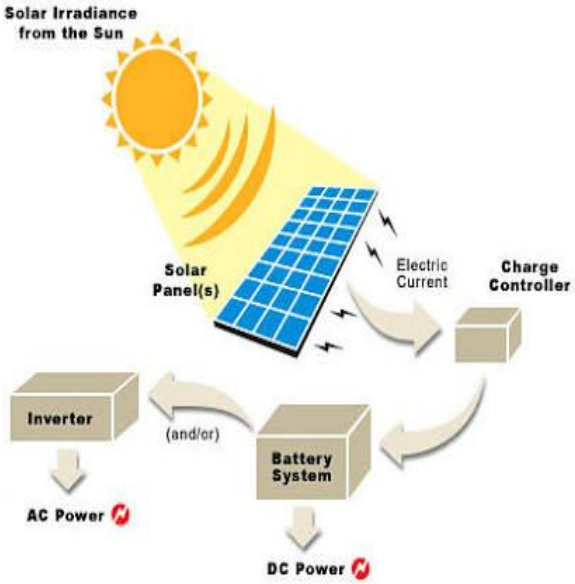

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Figure 2 Working of solar energy

IV. MODELING OF PV PANEL

A. Solar Cell (Photovoltaic Cell)

The cells converted solar radiation directly into electricity. It consist various kinds of semiconductor materials. It has two types: positive charge and negative charge shown on fig.1.This cell technology are used to design solar cells with low cost as well as high conversion efficiency. When the cell absorbed photons from sunlight, electrons are knocked free from silicon atoms and are drawn off by a grid of metal conductors, pressure a flow of electric direct current. Solar cell PV made up of many chemicals.

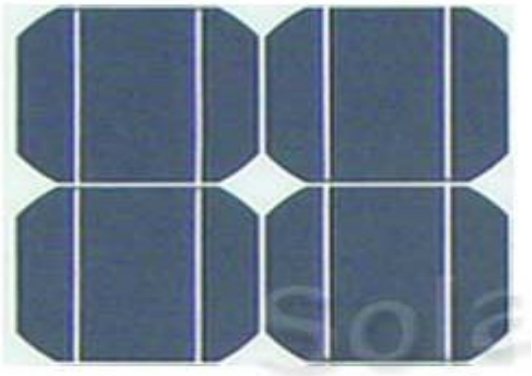

Figure 3 Photovoltaic Cell (4 cell)

B. Photovoltaic Module

A PV module consists of solar cell circuits sealed in an environmentally protective laminate and are the fundament building blocks of PV system. Generally sizes from 60W to 170W. Usually a number of PV modules are arranged in series and parallel to meet the energy requirement.

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Figure 4 Photovoltaic Module (Multiple cell)

C. Photovoltaic Panel

It includes one or more PV modules assembled as a pre-wind, field instable unit. In this panel PV cell is series connections. Solar panels are made up of individual PV cells connected together.

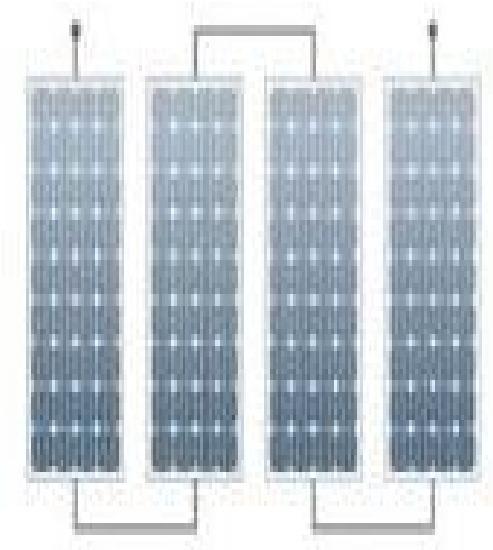

Figure 5 Photovoltaic Panel

D. Photovoltaic Array

It is contain of several amount of PV cells in series and parallel connections. Series connections are responsible for increasing the voltage of the module whereas the parallel connection is responsible for increasing the current in the array. It generates maximum 180W in full sunshine. Large the total surface area of the area of the array, more solar electricity it will produce.

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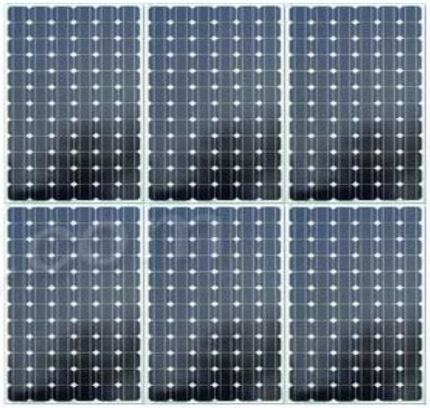

Figure 6 Photovoltaic Arrays (Multiple Modules)

V. SOLAR CONCRETE COLLECTOR

A. Parabolic Trough Reflectors

It contain of linear parabolic reflector concentrates light onto a receiver positioned along the reflector's focal line. It consists of receiver is a tube positioned directly above the middle of the parabolic mirror and fluid with a working fluid. A working fluid is heated 150-350 ^{0}Cas it flows though the receiver is then used as heat source for a power generation system.

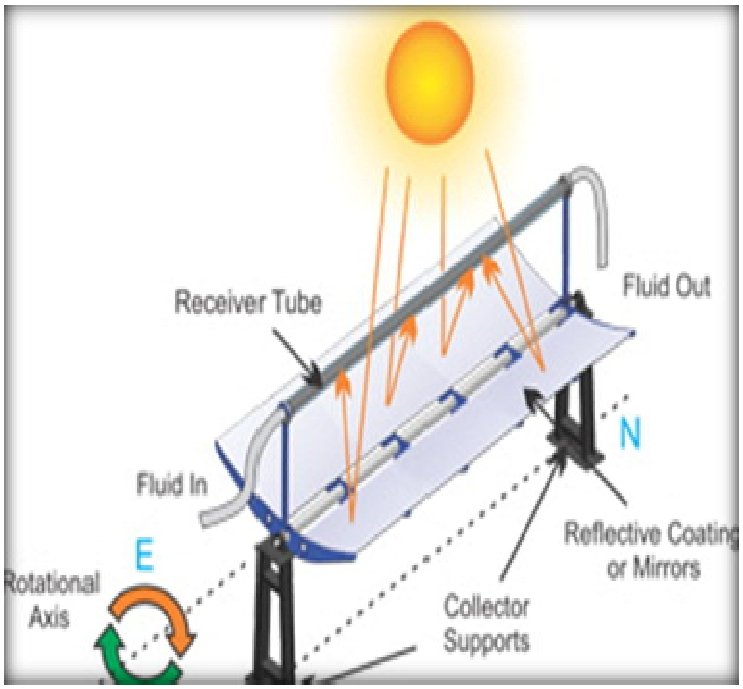

Figure 7 Parabolic Trough Reflectors

B. Fresnel

In a Fresnel lens, the refraction happens to produce in the surface, while the large material between the two surfaces doesn't have any problems in the refraction. It will use raise more temperature than conventional one and also used in furnace heating. It installation has been used for surface modifications of metallic materials. This equipment is applying solar energy in the field of high and very high temperatures. These temperatures are achieved in a few seconds. Fresnel concentrator performed 34.3% reduction in reflective area compared to a parabolic of the same diameter, the 20 minutes series of action performance needed for manual adjustment in order to track the sun proved to be a major disadvantage with this device.

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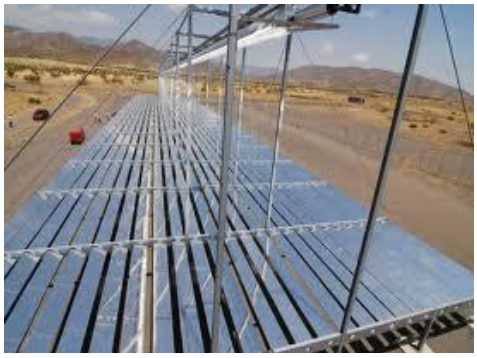

Figure 8 Fresnel Reflector

C. Parabolic Dish

It similar in appearance to a large satellite dishes, but has mirror like reflectors and absorber the focal point. It used a dual axial sun tracking. It is efficiency of 30% achieved. By this dish it produces in MW level in solar plant. This is highest conversion performance of the concentrating solar power technology.

Figure 9 Parabolic Dish

D. Central Receiver

It mostly used in large scale plants that are usually making the more amount power. It also called as “Power Tower”. It operates by focusing a field of thousands of mirrors on to a receiver located at the top of a centrally located Tower. The receiver collects the sun’s heat transfer fluid, which is used to generate stream turbine located at the foot of the tower for production of Electricity.

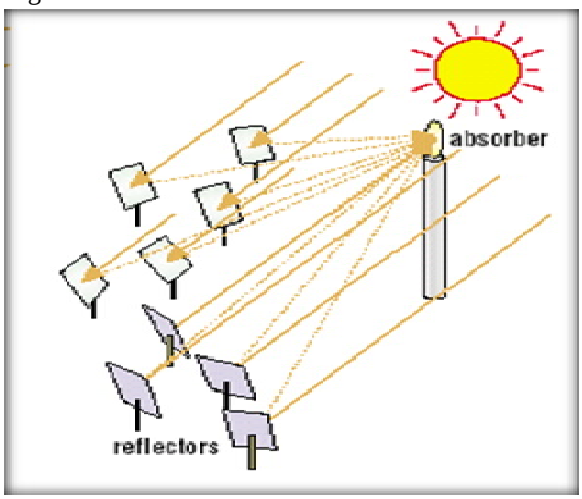

Figure 10 Central Receiver

VI. MERITS OF SOLAR ENERGY

It is save up to 20% of energy costs. It can use in Remote Locations. Easy Installation (i.e. does not required any wires, cords etc.).Rooftop which means no new space is needed & every domestic or commercials user can generate their own electricity. It is widely available of sunlight with free of cost, eco-friendly, renewable resource. It has no moving parts and not required any additional fuel, other than sunlight, to produce power. No need of water and fuel.

VII. DEMITS OF SOLAR ENERGY

No generation of energy, when the sun is not shining. Initial cost is high. More area needed for large amount power. For alternating Current (AC) application required of inverter and also storage at night. Production PV systems single silicon crystals is technically challenging, energy, time consuming.

VIII. APPLICATIONS OF SOLAR ENERGY

It is used in many applications including electricity, evaporation, heating water, Heating and cooling of buildings, cooking of food, water pumping etc.

Figure 11 Application for heating water

Figure 12 Application for Water pumping

Fig.13.Application for cooking food

IX.CONCLUSION

Most of the people are aware about non-renewable energy resources. Solar energy has become increase more popular due to their economic benefits. By on Battery Backup, Solar Energy can even provide Electricity 24x7, even on cloudy days and at night. This also used with inter-grid System with Continuously Power supply. It has more benefits compared to other forms of energy like fossils fuels and petroleum deposits. It is an alternative which is promise and consistent to meet the high energy demand. Research on solar cell and solar energy is promise has a future worldwide.

X. ACKNOWLEDGMENT

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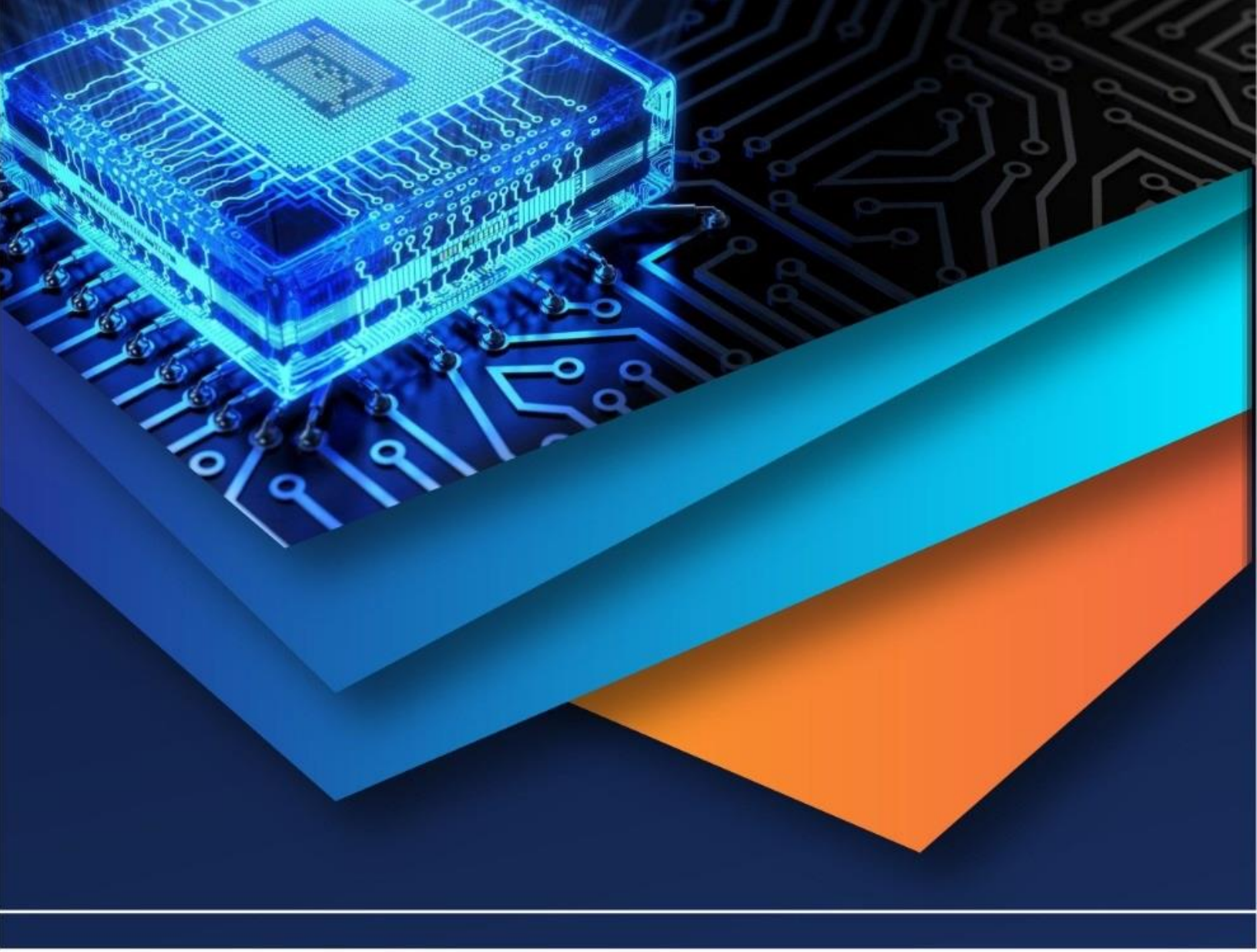

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